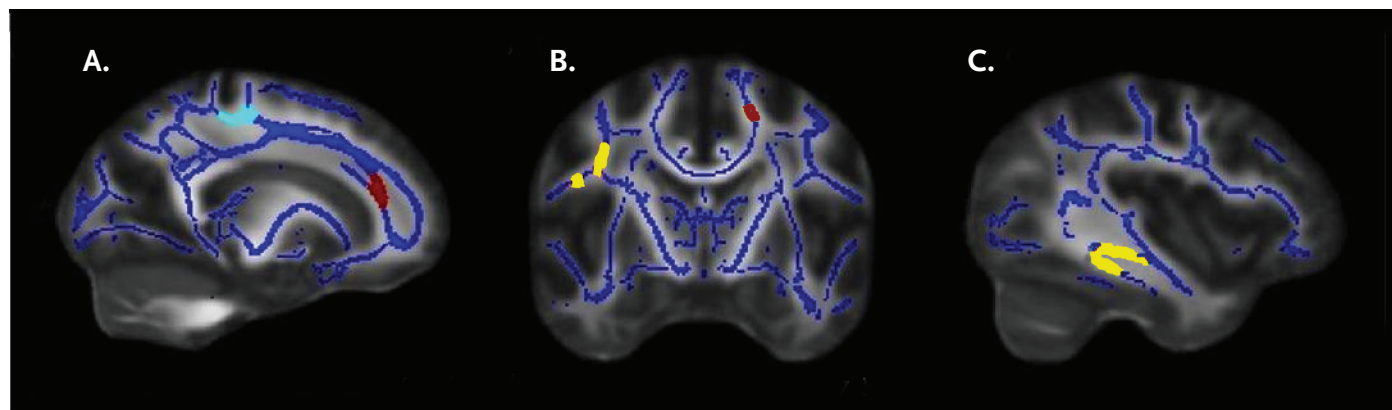


Graphic Evidence

MATURING BRAIN: HIS AND HERS



A 12-year-old brain possesses almost all of the neurons that it will ever have, but still has some maturing to do. Throughout the rest of adolescence and into adulthood, this organ will refine its white matter tracts. These bundles of axon fibers function as the wires in the circuits that connect the neurons in the brain's many regions. Their carrying capacity and speed determine the degree of coordination between the brain's diverse specialty areas, so are essential in shaping our capabilities and behavior.

NIDA-funded researcher Dr. Susan F. Tapert led a diffusion tensor imaging study of white matter in 29 boys and 29 girls, all of whom were healthy and aged 12 to 14. The above images are three different views of the participants' composited white matter tracts. Together, they provide a snapshot of normal white matter development in early adolescence. They point to some contrasting abilities and behaviors of boys and girls at this stage of life.

The girls' fibers showed evidence of being more mature than the boys' in corticospinal tracts (cyan in A), which promote motor and verbal skills. The boys' fibers appeared to be of higher caliber than the girls' in the frontal cortex forceps minor (red in A and B) and the longitudinal fasciculus (yellow in B and C), tracts that support rational decision-making and avoidance of risky choices. Tracts shown in navy did not differ significantly between the two genders.

Dr. Tapert and colleagues conducted the study at the University of California and the Veterans Medical Research Foundation in San Diego. Studies that elucidate normal brain maturation will help researchers identify white matter deviations that result from disorders such as substance abuse or lead to disorders such as depression and schizophrenia.

Source: Bava, S., et al., 2011. Sex differences in adolescent white matter architecture. *Brain Research* 1375(13):41–48.